

## REMARKS

Claims 22 and 27-28 have been rejected under 35 U.S.C. § 112, second paragraph. Claim 22 has been canceled. The term "0.13 $\mu$ m" is directed to the surface topography of the bearing such that the surface of the bearing is smoother after the process than before the process began. Thus, all of the 35 U.S.C. § 112 rejections should now be withdrawn.

Claims 17-19 and 22-30 have been rejected under 35 U.S.C. §103(a) as being unpatentable over either Hashimoto '770 or Wood '277 and claims 20-21 have been rejected under 35 U.S.C. §103(a) as being unpatentable over either Hashimoto '770 or Wood '277, further in view of Ohno '302.

The Examiner's rejections are respectfully traversed.

As amended, the claims are directed to a method of treatment of rolling element bearing component by hard particle abrasion. The method includes immersing the component in a receptacle containing hard abrasive particles and agitating the bearing component, hard particles or both to produce relative movement therebetween and to improve the surface topography of the component for a period substantially in excess of the period  $T_{opt}$  where  $T_{opt}$  is defined as  $T_{opt} = -T \log_e(Ar - Dr) / (Ir - Dr)$ . The time period continues until a residual compressive stress of between 200MPa and 500MPa is induced in the surface of the component.

The examiner has stated that the compressive strength increase would have been an expected result of performing the method of either Hashimoto or Wood. The applicants disagree with the examiner's statement. The bearings manufactured according to the present invention have such a surprisingly larger compressive strength and thus a large life span as

opposed to bearings finished according to the prior art methods. Previously, the inventors have enclosed evidence illustrating the increased compressive strength of the bearings prepared according to the applicants' invention versus those of the prior art methods. This evidence shows the surprising result of the present invention and that while the prior art methods reduce surface roughness, the bearings do not have the same residual compressive strength and thus increase in bearing life as those prepared according to the method of this application. The results of this invention are totally unexpected.

The Hashimoto reference, does not discuss any residual compressive strength and thus the examiner cannot assume that the same unexpected result automatically exists in the prior art references. In fact, the components prepared according to Hashimoto '770 do not have the same residual compressive strength as those prepared according to the applicants' method.

The time period for which the process must be applied in order to achieve the result varies according to numerous factors such as the size, shape, and material of the component and also the specific particle abrasion system in use, for example, the material and the size of the particles, whether or not a liquid is present, whether abrasion is achieved by vibration or rotation and the speed of the vibration or rotation. Thus, while there is an apparent overlap between the present invention and the prior art, it is not a comparison of like method for like method. The samples subjected to the process defined in Hashimoto would not achieve the desired residual compressive stress. As now amended, the claims exclude the invention of Hashimoto from the scope of the present invention. In fact, the applicants have found that the compressive strength increase simply does not occur to any significant degree unless the process is imposed for a period much longer than that required to achieve the desired surface roughness and thus one may imagine for the inventive process to work, the work piece which

was finished by Hashimoto in 45 minutes, would require at least an hour according to the applicants' invention.

The applicants have devised a new radical process for treating the bearing component with such astonishing advantage over the prior art. The Hashimoto disclosure treats a component for a period  $T_{opt}$  which is the minimum time required to achieve the desired surface roughness. Again, however, the bearings prepared under this method will not have the change in desired compressive stress as that claimed by the applicants.

In view of the foregoing, it is believed that the amended claims and the claims dependent there from are in proper form. The Applicants respectfully contend that the teachings of Hashimoto '770 and Wood '277 do not establish a *prima facie* case of obviousness under the provisions of 35 U.S.C. §103(a) nor does the additional teachings of Ohno render the claims as obvious. Thus, claims 17, 19-21 and 23-30 are considered to be patently distinguishable over the prior art of record.

The application is now considered to be in condition for allowance, and an early indication of same is earnestly solicited.

Respectfully submitted,



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